

### **R E M A R K S**

Reconsideration of this application, as amended, is respectfully requested.

### **SPECIFICATION**

The specification has been amended to explicitly point out that the well known abbreviation AF stands for "automatic focusing" and the abstract has been amended to remove the transitional phrase.

No new matter has been added, and it is respectfully requested that the amendments to the specification and abstract be approved and entered, and that the objection to the disclosure be withdrawn.

### **THE CLAIMS**

New independent claim 18 has been added to more clearly recite the distinguishing features of the defect inspection apparatus of the present invention, and independent claim 9 has been amended to more clearly recite the distinguishing features of the defect inspection method of the present invention.

In addition, claims 2, 3, 7 and 9-11 have been amended to better accord with new independent claim 18 and amended independent claim 9, respectively, as well as to make some minor grammatical improvements.

Still further, new claims 19-26 have been added to recite additional features of the inspection apparatus of the present invention depending from new independent claim 18 and amended independent claim 9, respectively.

Finally, claims 1, 5, 6, 8 and 13-17 have been canceled, without prejudice.

No new matter has been added, and it is respectfully requested that the amendments to the claims be approved and entered and that the objection to the claims be withdrawn.

#### THE PRIOR ART REJECTION

Claims 1-17 were rejected under 35 USC 103 as being obvious in view of the combination of USP 4,496,971 ("West et al") and USP 5,761,336 ("Xu et al"). This rejection, however, is respectfully traversed with respect to the claims as amended hereinabove.

According to the present invention as recited in amended independent claim 9, a defect inspection method is provided which includes performing focusing control so that automatic focusing is achieved on a reference part determined to be normal beforehand according to a first focusing control parameter, determining a second focusing control parameter based on sample information obtained when performing the focusing control to achieve the focusing on the reference part, obtaining a pattern

image of the reference part, driving a stage or objective lens in order to change the observation part of the observation object to a part to be inspected, setting the focusing parameter to the second focusing parameter, performing the focusing control in order to achieve focus on the part to be inspected according to the second focusing control parameter, then obtaining a pattern image of the part to be inspected and detecting the presence or absence of an abnormal condition of the part to be inspected by making a comparison between the pattern image of the reference part and the pattern image of the part to be inspected.

According to the present invention as recited in new independent claim 18, moreover, a defect inspection apparatus is provided which includes, inter alia, a focusing unit for changing a relative distance between a stage on which an observation object is placed and an objective lens which images the object, a focusing control unit for performing automatic focusing by driving the focusing unit to focus on the observation object, a parameter setting unit for setting a focusing control parameter used for controlling the automatic focusing, a pattern image obtaining unit for obtaining a pattern image of an observation part in the object, and a detecting unit for detecting the presence or absence of a defect of a part to be inspected by making a comparison between the pattern image of a reference part in the observation object stored in a pattern image storing unit

and the pattern image of the part to be inspected in the observation object. As recited in new independent claim 18, the pattern image obtaining unit obtains the pattern image of the reference part in the observation object determined as normal beforehand (i.e., before the defect analysis) by performing the focusing control via the focus control unit using a first focusing control parameter set by the parameter setting unit, and changes the observation position to the part to be inspected and obtains the pattern image of the part to be inspected by performing the focusing control via the focus control unit using a second focusing control parameter set by the parameter setting unit. And as recited in new independent claim 18, the focusing control unit determines the second focusing control parameter based on sample information obtained when performing the focusing control to obtain the pattern image of the reference part.

Accordingly, the claimed present invention obtains a pattern image of the part to be inspected while focusing on that part according to a "second" focusing parameter which is based on "sample information obtained when performing the focusing control to achieve the focusing on the reference part" (as set forth in amended independent claim 9) or "sample information obtained when performing the focusing control to obtain the pattern image of the reference part" (as set forth in new independent claim 18). In both cases, information obtained while focusing on the

reference part is used when determining the "second" focusing control parameter to use when focusing on the part to be inspected. This information may be information about the focusing position of the reference part and/or a light amount according to light reflected from the reference part (as set forth in amended claim 7) and/or information about movement speed of the focusing unit, a search range used when acquiring the observation object, an autofocus method, an offset amount and a contrast threshold (as set forth in new claim 23).

With this structure, the claimed present invention is capable of performing focusing control to detect defects in semiconductor chips, knowing information about a reference chip, by applying a focusing control parameter, determined by sample information obtained when performing focusing control on the reference chip, when obtaining pattern images of chips being inspected which are different than the reference chip.

It is respectfully submitted that the prior art references cited by the Examiner do not disclose, teach or suggest the above described features and advantageous effects of the defect inspection apparatus and method of the present invention as recited in the amended claims.

West et al relates to an apparatus for detecting defects in a circuit board using pattern matching and a method relating to the pattern matching. In West et al, a parameter for analyzing

images of the circuit board is optimized by detecting features of the image. However, in contrast to the present invention, and as pointed out by the Examiner, West et al does not teach setting a focus control parameter used for automatic focus control.

Xu et al describes detecting defects in a sample using a microscope in which aperture stop (AS) is controlled to optimize lighting conditions by comparing known defect information with correction sample images. A first image of the correction sample is obtained using the diameter of a first AS and a second image of the correction sample is obtained using the diameter of a second AS. Then, the first and second images are analyzed to determine which image is more similar to the defect information known beforehand and thus obtain the better AS diameter. As such, multiple images of the correction sample are obtained at different lighting conditions (AS) to determine which should operatively be used.

In contrast to the claimed present invention, however, the AS parameter determined in Xu et al is not based on sample information obtained when performing focusing control to achieve the focusing on a reference part (as set forth in claim 9) or obtained when performing focusing control to obtain a pattern image of a reference part is obtained (as set forth in claim 18). Rather, information about the focusing on the correction sample

is not used in Xu et al when focusing on the samples being inspected.

At page 8 of the Office Action, the Examiner refers to column 6, lines 10-67 of Xu et al as disclosing steps, parameters and calibrations for the focusing control parameter setting unit for the focusing control to perform. However, this portion of Xu et al does not disclose setting a focusing parameter for an automatic focusing operation. Moreover, this portion of Xu et al does not mention setting a focusing parameter for automatic focusing when inspecting a reference part to obtain information about the focusing which can be used for setting a focusing parameter for automatic focusing when inspecting other parts.

Accordingly, it is respectfully submitted that West et al and Xu et al do not disclose, teach or suggest a defect detection method and apparatus including all of the features of independent claims 9 and 18, respectively.

Moreover, it is respectfully submitted that it would not have been obvious to one of ordinary skill in the art to combine the teachings of Xu et al and West et al because Xu et al relates to selecting an optimized lighting condition to detect defects and does not address the issue of differences in focusing position (i.e., the position between an objective lens and parts being observed) which are generated when conducting a defect inspection based on comparison of pattern images of the reference

part and parts to be inspected. Since differences in focusing position are not considered by, or even relevant to Xu et al, it is respectfully submitted that one of ordinary skill in the art would not consider applying any of its purported teachings in combination with West et al which involve analysis of pattern images with the attendant problem of defects arising as a result of focusing position differences.

In view of the foregoing, it is respectfully submitted that the present invention as recited in amended independent claims 9 and 18, and claims 2-4, 7, 10-12 and 19-26 respectively depending therefrom, clearly patentably distinguish over West et al and Xu et al, taken singly or in combination, under 35 USC 103.

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Entry of this Amendment, allowance of the claims and the passing of this application to issue are respectfully solicited.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned for prompt action.

Respectfully submitted,

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